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Patient-Reported Outcomes

Development and Validation of the MiPrep Survey: An Instrument Assessing Patients' Perceived Preparation for Medical Interventions Including Medical Imaging, Radiotherapy, and Surgery

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ABSTRACT

Background: Adequately preparing patients for medical interventions is an important component of quality healthcare. Nevertheless, few instruments for assessing patients' preparation exist.

Objectives: To develop a psychometrically rigorous instrument to assess patients' perceptions of the quality of preparation.

Methods: An instrument to measure patients' preparation for medical interventions (MiPrep) was developed and tested with patients undergoing medical imaging, radiotherapy, or surgery. Patients were recruited and asked to complete 2 surveys. Survey A assessed patient and intervention characteristics. Survey B (postintervention) contained MiPrep to assess validity (face, content, and construct) and reliability (internal consistency and test-retest).

Results: A total of 869 (85%) patients consented to participate and 551 (63%) returned the postintervention survey. Face and content validity were demonstrated. Exploratory factor analysis identified 2 survey modules: receipt and adequacy of information (2 domains) and overall appraisal of patient-centered care (1 domain). Reliability was evidenced by adequate internal consistency (Cronbach α 0.81-0.89) and item-total correlations higher than 0.20. Nevertheless, individual item test-retest reliability requires further confirmation. The final instrument contained 27 items.

Conclusions: The MiPrep instrument has evidence of being a valid and reliable instrument of preparation for medical interventions. Healthcare providers can use the instrument as a quality assurance tool to identify areas for improvement and areas of excellence in patients' preparation. Future studies should verify these findings in other populations and examine the divergent and predictive validity of the instrument.

Keywords: diagnostic techniques and procedures, psychometrics, quality of healthcare, surveys and questionnaires

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Introduction

The term *medical intervention* refers to all forms of diagnostic procedures, tests, and treatment.[1] Adequately preparing patients for a medical intervention is an important component of high-quality healthcare. All interventions are associated with some level of risk, and many require patients to manage side effects associated with the intervention. Informing patients about the nature, benefits, risks, alternatives, and consequences of the intervention[2] is also an ethical and legal imperative.[3] Preparation involves providing the patient with information, education, and support to ensure that they are well equipped for the intervention. A number of steps may be involved, including risk communication, decision making, the provision of procedural information and sensory information,[4] behavioral instruction,[5] and psychosocial aspects, for example, discussion of the patient's emotions.[5,6] Best practice preparation improves physical and psychological outcomes, increases patient satisfaction and knowledge, and reduces imaging examination nonattendance.[7–11] Nevertheless, patients are often unprepared for medical interventions. For example, it has been reported that after agreeing to treatment, many patients are unable to answer basic questions about the interventions they agreed to receive.[12]

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The measurement of patient perceptions of the quality of healthcare delivery is an important component for health service monitoring, improvement, and evaluation.[13–15] Given the importance of preparing patients for medical interventions, adequately measuring this component of care will enable areas for improvement to be identified. It is essential that the instrument meets standard psychometric criteria including reliability or consistency,[16] validity,[16] acceptability to those who will complete the instrument, and feasibility for those who will administer the instrument.[16,17]

A systematic review[18] identified that few comprehensive and psychometrically robust measures of preparation exist. Only 1 existing instrument included all the 5 commonly recommended preparatory content areas.[19] There has also been limited attention to the assessment of preparation for minimally invasive medical interventions. This is an important gap given that it has been suggested that healthcare providers set aside any preconceptions about minor and major medical interventions when preparing patients, because both may cause distress to patients.[20] Furthermore, most measures have been developed exclusively for, or tested only with, cancer populations. There are also no generic measures designed for use across medical interventions or conditions. A generic measure would be helpful for benchmarking and comparing the quality of patient preparation across populations and services.

The overall aim of this study was to develop a psychometrically rigorous instrument to measure the adequacy of patients' preparation for medical interventions.

Methods

Phase 1: Item Development

Initial item generation

Review of the literature. The published literature, including current guidelines,[1] was assessed to identify factors that may influence patients' preparation for a medical intervention. The needs, concerns, and issues facing patients were identified and the items of existing instruments were reviewed and considered for inclusion if they were commonly identified by patients as being important. From this review, a draft instrument was developed and the following procedures were undertaken with Human Research Ethics Committee approval (H-2012-0022 and 14/09/10/5.03). For all studies in this article, all measures, conditions, data exclusions, and sample size determinations that relate to the target research question are reported.

Item refinement and face and content validation

Professional input. The 32-item draft instrument was reviewed by an expert panel of behavioral scientists and psychosocial professionals (n = 7; 6 females) who were asked to review each item and provide independent feedback in relation to relevance and completeness. This resulted in the refinement of the wording of some items. Nevertheless, the experts agreed that all items were relevant.

Patient input. To develop an instrument suitable to a wide range of medical interventions, a purposive sample of patients undergoing common medical interventions including medical imaging, radiotherapy, and surgery was recruited to participate in a telephone interview that explored their experiences. This included 33 patients undergoing medical imaging (angiography, computed tomography, fluoroscopy, magnetic resonance imaging, ultrasound, or x-ray), 26 patients undergoing radiotherapy, and 5 patients who had undergone surgery. Patients in all subsamples were recruited from outpatient clinics from 2 hospitals while awaiting their appointment. Participants were adults, able to read and speak English, and considered physically and mentally capable of participating in the study by clinic staff. Participants completed a semistructured telephone interview within 2 weeks of recruitment that explored how well they perceived they were informed and prepared for their intervention. Participants were aged from 19 to 84 years (mean age 60 years), of whom 35 (54.7%) were men. An in-depth qualitative analysis about the preparation experiences of the radiotherapy patient subsample is reported in a separate article.[21]

This iterative consultation and input from both patients and healthcare professionals helped to refine and confirm the relevance of the items included in the instrument and resulted in the addition of 9 items (total = 41 items).

Pilot testing

To further confirm the content and face validity of the instrument, a separate sample of 4 medical imaging patients and 3 radiotherapy patients was recruited to pilot-test the instrument using the same eligibility criteria and recruitment methods previously described. These participants were aged from 47 to 79 years (mean age 67 years) and 5 were men. Participants were given a copy of the survey at the time of recruitment to take home and review. They then completed a telephone interview approximately 2 weeks later. Participants were asked how easy the questionnaire and respone scale were to understand and how comprehensively did they cover issues related to preparation for the medical intervention the participants had received. Item wording and response options were refined on the basis of this feedback. No items were deleted.

The *preliminary instrument* consisted of 41 items measuring the adequacy of patient preparation for medical interventions (MiPrep) across 2 sections that have different response scales. The first section (MiPrep module 1) included 25 items to assess whether patients peceived that they received information on a range of preparatory aspects, such as the provision of risk, procedural, sensory, behavioral, and psychosocial information. For this section, patients responded to each item via a 5-point response scale: "Yes, more than I wanted," "Yes, as much as I wanted," "Yes, but less than I wanted," "No, but I wanted some," and "No, but I did not want any." These response options were chosen to examine both the receipt of and the patient-centered adequacy of preparation. The second section (MiPrep module 2) included 16 items to assess patients' overall experience, via a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." The final items included are presented in Tables 1 and 2.

Phase 2: Assessment of the Psychometric Properties of the Instrument

Using a classical test theory approach, the following psychometric properties of the instrument were investigated in a sample of patients who had undergone medical interventions: reliability (internal consistency and test-retest), validity (construct), acceptability, and feasibility. Preestablished criteria were used to determine whether each of these psychometric properties was achieved (see Statistical Analysis section).

Setting and participants

A separate sample of patients undergoing a diverse range of elective medical interventions was consecutively recruited (ie, all accessible and eligible patients were approached) from 4 sites, including 1 medical imaging department at an inner regional

Table 1. Factor loadings, internal consistency, and item test-retest reliability for the 18 items of the MiPrep instrument module 1 (information needs), determined using responses from participants who had undergone medical interventions (N = 551).

Factor/item description	Factor loadings	Corrected item-total correlations (item-rest correlation)	Cronbach α if item deleted from subscale	Test-retest reliability	Mean ± SD	Median (Q1, Q3) (range: 1-5 for all items)
Factor 1: Preintervention information						
My condition or disease	0.82	0.54	0.79	0.45	3.71 ± 0.87	4.00 (4.00, 4.00)
The expected benefits of the procedure	0.71	0.56	0.78	0.45	3.70 ± 0.83	4.00 (4.00, 4.00)
The risks, potential side effects, or complications of the procedure	0.48	0.61	0.76	0.56	3.50 ± 1.10	4.00 (3.00, 4.00)
Whether there were other options to this procedure available to me	0.60	0.62	0.77	0.42	2.93 ± 1.38	4.00 (1.00, 4.00)
The likely consequences of not having this procedure	0.82	0.70	0.73	0.49	3.17 ± 1.30	4.00 (2.00, 4.00)
Factor 2: Intervention information						
Written information about the procedure	0.41	0.49	0.89	0.61	3.15 ± 1.32	4.00 (2.00, 4.00)
Information about the procedure in more than 1 format (eg, verbally and as a brochure, DVD, or recommended website)	0.51	0.61	0.88	0.58	2.93 ± 1.38	4.00 (1.00, 4.00)
Information about how other patients had experienced a similar procedure	0.47	0.48	0.89	0.59	2.12 ± 1.33	1.00 (1.00, 4.00)
What needs to happen before the procedure (eg, skin markings, special diet, and anesthesia)	0.67	0.57	0.88	0.54	3.56 ± 1.10	4.00 (4.00, 4.00)
What the procedure involves (eg, what would happen during the procedure)	0.75	0.63	0.88	0.63	3.61 ± 1.00	4.00 (4.00, 4.00)
What the equipment that would be used for the procedure looks like and how it works	0.80	0.66	0.88	0.58	3.27 ± 1.27	4.00 (2.00, 4.00)
Strategies to help me manage any anxiety or stress before or during the procedure (eg, listening to music)	0.80	0.61	0.88	0.52	3.07 ± 1.33	4.00 (2.00, 4.00)
What sensations I might experience *during* the procedure (eg, what I might feel or hear)	0.92	0.65	0.88	0.56	3.42 ± 1.15	4.00 (3.00, 4.00)
How long it would take to recover from the procedure	0.83	0.73	0.88	0.68	3.29 ± 1.23	4.00 (2.00, 4.00)
When and how I would find out the results of the procedure	0.42	0.32	0.89	0.56	3.56 ± 0.90	4.00 (3.00, 4.00)
If follow-up appointments or further procedures were needed	0.57	0.49	0.89	0.49	3.46 ± 1.09	4.00 (3.00, 4.00)
How to manage any side effects (eg, fatigue or pain) if they occur	0.82	0.73	0.88	0.72	3.13 ± 1.28	4.00 (2.00, 4.00)
Who to contact for further information or advice	0.71	0.65	0.88	0.57	3.24 ± 1.22	4.00 (2.00, 4.00)

SD indicates standard deviation.

hospital in New South Wales, Australia, and 3 radiotherapy departments. Two radiotherapy departments were located in Queensland—one within a private hospital and the other in a separate cancer treatment center. One radiotherapy department was located in New South Wales within a hospital that provides public hospital services. Participants were recruited between May 2015 and April 2017 using the same eligibility criteria previously described. Participant recruitment from radiotherapy departments was undertaken as part of a larger study that assessed emotional well-being, healthcare service utilization, and perceptions of cancer care.

Recruitment procedures

Patients were approached by clinic staff and introduced to a researcher while they were awaiting their appointment. The researcher sought informed consent from eligible patients to participate in the study. Consenting participants were asked to

Table 2. Factor loadings, internal consistency, and item test-retest reliability for the 9 items of the MiPrep instrument module 2 (overall appraisal of patient-centered care), determined using responses from participants who had undergone medical interventions (N = 551).

Factor/item description	Factor loadings	Corrected item-total correlations (item-rest correlation)	Cronbach α if item deleted from subscale	Test-retest reliability	Mean ± SD	Median (Q1, Q3) (range: 1-5 for all items)
Asked me how much information I wanted about this procedure	0.70	0.63	0.87	0.42	3.37 ± 1.07	4.00 (3.00, 4.00)
Encouraged me to discuss any fears or anxiety I had about the procedure	0.83	0.73	0.86	0.50	3.63 ± 1.03	4.00 (3.00, 4.00)
Explained to me that I could choose whether or not to have the procedure	0.77	0.68	0.86	0.47	3.51 ± 1.09	4.00 (3.00, 4.00)
Provided me with information about practical issues (eg, parking or transport available to me)	0.65	0.57	0.88	0.51	3.66 ± 1.12	4.00 (3.00, 4.00)
Asked me whether I wanted to have a support person (eg, family, carer, or close friend) with me	0.70	0.65	0.87	0.56	3.37 ± 1.11	4.00 (2.00, 4.00)
I was given information about the procedure that I could easily understand	0.79	0.63	0.87	0.49	4.00 ± 0.82	4.00 (4.00, 4.00)
The decision to have this procedure was made with respect to my values and preferences	0.80	0.67	0.87	0.58	3.94 ± 0.80	4.00 (4.00, 4.00)
I was well prepared for this procedure	0.74	0.61	0.87	0.64	3.97 ± 0.89	4.00 (4.00, 4.00)
I received enough emotional support from my healthcare providers (eg, care or assistance to help me cope with my feelings)	0.64	0.54	0.88	0.58	4.04 ± 0.91	4.00 (4.00, 4.00)

SD indicates standard deviation.

complete 2 surveys. Consenting participants at site 1 (medical imaging department) were asked to complete survey A, a brief survey before their appointment via a touchscreen computer tablet. This survey assessed demographic characteristics (sex, date of birth, marital status, highest level of education, employment status, private health insurance status, and concession card status), medical condition (either suspected or confirmed), and intervention details (intervention they were awaiting, reason for the intervention and if this was their first time having the intervention), and a rating of their overall health. Consenting participants were also provided with a pen-and-paper copy of a postintervention survey (survey B) including the newly developed instrument (MiPrep). At all other sites, because of insufficient time before their appointment, participants received a pen-and-paper copy of survey A to complete at home and post back. These participants were then posted survey B 1 month after recruitment. All participants were requested to complete survey B at home and return it to the researchers using a supplied reply-paid envelope within 3 weeks. Nonresponders received up to 2 mailed reminders at 3-weekly intervals.

The first 240 participants who returned their postintervention survey were additionally asked to complete a second copy of the MiPrep instrument within 7 to 14 days to assess test-retest reliability.

Statistical Analysis

Analysis was conducted using SAS version 9.4 (SAS Institute, Cary, NC) and STATA/IC 13 (StataCorp LP, College Station, TX).

Procedures to assess psychometric properties

Validity. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett test of sphericity were used to check the suitability of the data for exploratory factor analysis (EFA). The values of the correlation matrix were then examined. Because item responses were ordinal, polychoric correlations were estimated using pairwise deletion. Items were deemed collinear if the variance inflation factor (VIF) was more than 5 and/or polychoric correlations were more than 0.8. One item from the pair of collinear items was removed on the basis of the highest VIF and/or potential clinical utility.

Because this is a new measure, an EFA was conducted to establish construct validity. Iterated principal-factor analysis was chosen because of the skewed data.[22] The number of factors to retain in the final model was determined using a mixed methods approach,[22,23] including (1) the Kaiser criterion (or the eigenvalue >1 rule), (2) assessment of the elbow in scree plot, and (3) parallel analysis.[22] Multiple EFA tests were conducted on the basis of the findings of these 3 methods. Promax oblique rotation was used to

simplify the factor structures because it was expected that there would be some correlation among factors.[23] The final factor structure was determined on the basis of the following criteria: minimum item loadings of 0.32,[24] no or few item cross-loadings, and no factors with less than 3 items.[23]

Reliability. Internal consistency was assessed using Cronbach α coefficients, with values between 0.70[16] and 0.95[25] considered acceptable. Item-total correlations between 0.20 and 0.80 were also considered acceptable.[26]

Because it is an ordinal scale, item test-retest reliability was examined using weighted κ[27] with quadratic weighting. Items with a κ statistic of more than 0.6 were considered acceptable across time 1 and time 2.[28] Domain test-retest reliability between mean scores from time 1 and time 2 was examined using intraclass correlation coefficient (ICC), with ICCs of 0.7 and higher considered acceptable.[16]

Acceptability and feasibility. The time to complete the instrument, response rate, and percentage of missing items were examined as indicators of acceptability and feasibility. A completion time of less than 20 minutes and low levels of nonresponders (<60%)[29] and missing items (<10%) were considered acceptable. Sex was compared between consenters and nonconsenters using the Fisher exact test.

Sample Size

In line with recommendations, a minimum sample of 300 was deemed adequate for factor analysis.[30] A sample of 150 participants allowed the agreement of our instrument with 95% confidence intervals to be estimated with a margin of 0.2 from a true ICC of 0.7.

Scoring of the Modules

Domain scores were calculated for participants who completed more than 50% of items, by summing all items in the domain and dividing by the number of nonmissing items. The scale for module 1 was reversed so that for both modules higher domain scores represented higher levels of preparation. This straightforward method of scoring was used to allow assessment of the range and distribution of the domain scores of the measure.

Results

Of 1436 patients approached, 1028 were eligible, of whom 869 (85%) consented to take part in this study and 551 patients returned the postintervention questionnaire (63% completion rate). Demographic characteristics of the study sample are presented in Table 3. Participants were aged 19 to 92 years and were undergoing various medical interventions. There was no significant difference in sex between consenters and nonconsenters. Of the 240 participants who were sent a second copy of the questionnaire for test-retest purposes, 181 (75%) returned a completed copy.

Construct Validity

Because of the different structure of item responses, 2 EFAs were conducted, 1 module for each response type. The Kaiser-Meyer-Olkin measure was 0.91 for module 1 and 0.88 for module 2. The Bartlett test was statistically significant for both modules (both $P = .000$), indicating that the sample was appropriate for EFA.

MiPrep module 1 EFA

Eight items were deemed collinear on the basis of the prespecified criteria, resulting in the removal of 4 items. The EFA was conducted on 520 observations according to the smallest number for pairwise correlations. On the basis of participant responses indicating lack of variation (item 7; see Acceptability and

Table 3. Demographic and disease characteristics of the final sample of participants who had undergone a medical intervention (N = 551).*

Characteristic	Value
Age (y), mean (range)	61 (19-92)
Sex, n (%)	
Male	262 (47.7)
Female	287 (52.3)
Marital status, n (%)	
Single, never married	59 (11.0)
Married or living with partner	347 (64.5)
Separated or divorced, or widowed	132 (24.5)
Education, n (%)	
Secondary school or lower	333 (66.3)
Trade or vocational training (eg, TAFE or college)	113 (22.5)
Tertiary	56 (11.2)
Other	10 (2.0)
Working status, n (%)	
Working (full- or part-time)	167 (31.0)
Not working (home duties, unemployed, retired, disability pension, other)	372 (69.0)
Private health insurance, n (%)	
Yes	263 (48.7)
No	277 (51.3)
Concession card,† n (%)	
Yes	347 (64.1)
No	194 (35.9)
Medical intervention, n (%)	
Radiotherapy	197 (36.1)
MRI	134 (24.5)
CT	61 (11.2)
Ultrasound	49 (9.0)
X-ray	33 (6.0)
Fluoroscopy	33 (6.0)
Angiography	16 (2.9)
Selected more than 1 modality	12 (2.2)
Other (including "Did not know")	11 (2.0)
Prior experience of the intervention, n (%)	
Yes	233 (42.9)
No	308 (56.7)
Unsure	2 (0.4)
Reason for the intervention, n (%)	
To find the cause of a problem or symptoms for an undiagnosed condition	105 (19.4)
To confirm a doctor's diagnosis	51 (9.4)
To determine the course or receive treatment for a diagnosed condition	274 (50.7)
To check or follow-up on a previous treatment or diagnosed condition	109 (20.2)
Medical condition (either suspected or confirmed), categorized by body system, n (%)	
Musculoskeletal (eg, osteoarthritis and bone fracture)	64 (11.8)
Neoplasm (malignant, benign, unspecified, or uncertain)	296 (54.6)
Circulatory (eg, chest pain, aneurism, and stroke)	48 (8.9)
Digestive (eg, colitis, esophagitis, and liver disease)	37 (6.8)
Other body system (nervous, endocrine, or genitourinary)	42 (7.8)
Other condition (eg, general symptoms [eg, headache], infection, and pregnancy)	26 (4.8)
Don't know	29 (5.5)

CT indicates computed tomography; MRI, magnetic resonance imaging; TAFE, technical and further education.
*Observations within each variable may not add to total sample size because of missing values.
†An Australian government–issued card that enables access to health services and medicines at a reduced cost.

Feasibility section), another item was excluded from the model. The Kaiser criterion suggested a 2-factor structure, whereas the scree plot and parallel analysis both suggested a 3-factor structure. Nevertheless, after rotations, the third factor interpretation relied on only 2 items. Two- and four-factor structures were explored, and a 2-factor structure was chosen because it produced a reasonable structure and met the interpretability criteria (all final items had a factor loading of ≥0.32, few cross-loadings, and no factor had <3 items). The factors were labeled as (1) preintervention information (5 items) and (2) intervention information (13 items) (Table 1).

MiPrep module 2 EFA

No items had a VIF of more than 5; nevertheless, 7 items had polychoric correlations more than 0.8. Therefore, 4 items were removed. The EFA was conducted on 530 observations according to the smallest number for pairwise correlations. Two items with poor test-retest reliability and 1 item with participant responses indicating lack of variation, in addition to poor test-retest reliability (see later), were not included in this analysis. The Kaiser criterion suggested a 1-factor structure, and the scree plot and parallel analysis both suggested a 2-factor structure. After rotation of 1- and 2-factor structures, a 1-factor structure was deemed most appropriate because all final items appeared related from a content perspective, had a factor loading of 0.32 or greater, and the factor had at least 3 items. Nine items were used for all further analyses. The module/factor was labeled as overall appraisal of patient-centered care (Table 2).

Internal Consistency

All factors illustrated high internal consistency with Cronbach α values ranging from 0.81 to 0.89 (see Table 4), and all corrected item-total correlations were higher than 0.20 (see Tables 1 and 2). For each item, the Cronbach α if the item was deleted from the subscale is also presented (Tables 1 and 2).

Test-Retest Reliability

Of the 181 test-retest surveys returned, 27 were excluded because of the return interval between the 2 surveys exceeding 21 days. The mean time between time 1 and time 2 surveys was 10 ± 4.1 days. Five items had weighted κ coefficients more than 0.60, meeting the criterion for acceptable item test-retest reliability. Twenty-two items had moderate test-retest reliability (κ coefficients 0.41-0.60) and 2 items had fair test-retest reliability (κ coefficients 0.21-0.40). Any item for which the κ coefficient was 0.30 or less was examined and considered for removal on the basis of potential clinical relevance. This resulted in the removal of 2 items, leaving all final items with acceptable to moderate test-retest reliability. At the domain level, 2 of the 3 ICCs were less than the acceptable criterion of 0.7. Tables 1 and 2 present the test-retest reliability of each item included in the final model, and Table 4 presents test-retest reliability at the domain level.

Acceptability and Feasibility

A response rate of 63% is considered acceptable.[29,31,32] The mean time taken to complete the instrument was 10 minutes (range 2-60 minutes) and no item had more than 10% missing values (range 2.7%-7.4%). There was no item for which more than 80% of participants used only 1 of the response options. Nevertheless, item 40 (healthcare providers were friendly and approachable) was not included in the final model because of a high number of participants being scored as adequately prepared, indicating a lack of variation, in addition to poor test-retest reliability. Item 7 (estimated cost of the procedure) was also excluded because of a large number of responses indicating item irrelevance, in addition to poor test-retest reliability. Descriptive statistics for each item are presented in Tables 1 and 2 and for the domain level in Table 4.

Discussion

The MiPrep instrument was developed to measure patients' perceptions of the adequacy of their preparation for a medical intervention. Evidence for the reliability and validity of the MiPrep instrument is demonstrated from both the qualitative and quantitative evaluations of the psychometric properties of this instrument. The final instrument includes 2 modules. The first module assesses whether patients received information on a range of preparatory aspects and consists of 2 domains. The second module covers patients' overall appraisal of patient-centered care and consists of 1 domain. Use of the instrument may assist healthcare providers to efficiently examine the quality of preparation provided to their patients, including the identification of preparatory aspects that could be improved and the patient-centeredness of the preparation provided.

Each domain had evidence of acceptable internal consistency indicating that the items are homogeneous and measure a single underlying construct. In relation to reproducibility, only 5 items met our criteria for item test-retest. Nevertheless, despite this, all final items had acceptable to moderate test-retest reliability. Although the ICCs for mean domain scores also did not meet our acceptability criteria, again, all domains had moderate to substantial agreement. Even though there are no consistent

Table 4. Domain-related statistics (mean score, median score, Cronbach α, and test-retest reliability) for the MiPrep instrument, determined using responses from participants who had undergone medical interventions (N = 551).

Module	No. of items	No. of participants answering >50% of items	Score, mean ± SD	Median score (Q1, Q3)	Cronbach α	Test-retest reliability
Module 1: Information needs						
Preintervention information	5 (maximum score 25)	533	16.99 ± 4.24	19.00 (14.00, 20.00)	0.81	0.60
Intervention information	13 (maximum score 65)	535	41.89 ± 10.41	44.00 (36.00, 50.00)	0.89	0.82
Module 2: Overall appraisal of patient-centered care	9 (maximum score 45)	535	33.51 ± 6.35	34.00 (29.00, 37.00)	0.88	0.67

SD indicates standard deviation.

guidelines for the time frame between survey administrations,[33] a time frame of 7 to 14 days is commonly applied to measures that ask people to report on current symptoms (eg, quality of life). Nevertheless, this instrument asks patients to recall something that may have occurred up to 3 weeks ago. It may be that we needed to conduct the initial postintervention survey closer to the time of the medical intervention. Nevertheless, given that the MiPrep instrument was designed to assess the state of patients' preparation, rather than predict outcomes, the internal structure rather than temporal stability is the most crucial aspect of reliability,[16] and is well evidenced for this instrument.

Evidence for the potential responsiveness of this instrument is demonstrated because for each item, all response options were used and none had 80% or more of responses within 1 response category. This indicates that item responses have room to move to detect change. In addition, acceptability and feasibility were demonstrated with acceptable response rate, missing value rate, and completion time. These aspects are important because they increase the utility of the instrument.

Although the EFA demonstrates the construct validity of this instrument, other indicators of construct validity, including known-groups and divergent validity, could not be assessed in this study because of limited research in this area. In particular, because there is no standardized taxonomy[18] and limited confirmed conceptual structures in the area of patient preparation, it was difficult to develop a priori hypotheses. Although there are a number of other concepts relevant to patient preparation, such as patient-centered care,[34] shared decision making,[35–37] satisfaction,[13] and information needs,[38] these studies and instruments were not specifically focused on patient preparation, and thus do not provide a comprehensive assessment of this construct.[18] It is recommended that future research further investigate the conceptual structure of this measure and how it may relate to different subgroups, once adequate evidence relating to these constructs is developed. Because there is no criterion standard instrument that measures patient preparation, criterion validity, including concurrent and predictive validity, also could not be assessed. This instrument was designed to be applied to a range of medical interventions, thereby overcoming a limitation of the few existing instruments examining preparation.[18] During the assessment of psychometric properties, 14 items were removed for various reasons, including responses from patients indicating item irrelevance or lack of variation, as well as poor psychometric performance. Although we were not able to receive feedback from patients during this final process of item selection, we did not take a purely data-driven approach to item reduction, because we used expert review to determine whether items were conceptually or clinically relevant before removal. Furthermore, we followed recommended procedures for the assessment of reliability and validity including EFA when determining the final structure of the 2 modules.[16,22,23,25,26] Now that the factor structure has been determined, further testing is suggested to establish other psychometric properties. Furthermore, future research, including improving test-retest reliability, using item-response theory to inspect the instrument and verifying the findings in other populations is encouraged.

Clinical Implications

Healthcare providers can use the MiPrep instrument as a quality assurance tool to identify areas that could potentially be improved and areas of excellence in patients' preparation for medical interventions. For example, services can use the instrument to ensure they provide adequate material to patients, and for continuous quality improvement, as an indicator that they are adequately preparing patients, which may support the service to achieve accreditation in relation to service quality. There is a high potential for the use of this instrument to improve patient care. The anticipated benefits to patient care are improved patient preparation, including increased knowledge and satisfaction, and decreased distress.[8,39]

Study Limitations

Recruitment from medical imaging, radiotherapy, and surgery populations may limit the ability to generalize these findings to a broader population of medical interventions. Nevertheless, MiPrep was developed to be a generic instrument suitable for a range of medical interventions. Furthermore, the instrument could be used as a core set of items supplemented with additional intervention-specific items if required. It is recommended that further research be conducted to assess whether MiPrep is appropriate for use in other populations.

Conclusions

The MiPrep instrument has evidence of being a valid and reliable measure of patient perceptions of preparation for medical interventions. To provide further support for the psychometric properties of the MiPrep instrument, these findings should be verified in other populations. In addition, individual item test-retest reliability, confirmatory factor analysis, divergent validity, and predictive validity require examination in future research. Use of MiPrep may assist healthcare providers to improve patients' experiences with care.

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